CLAIMS

1. A spectroscope for detecting vulnerable plaque within a lumen defined by an intraluminal wall, the spectroscope comprising:

    a probe having

        an optical fiber extending therethrough, and

        an atraumatic light-coupler in optical communication with the optical fiber, the coupler being configured to atraumatically contact the intraluminal wall;

    a light source in optical communication with the fiber for illuminating the wall; and

    a detector in optical communication with the fiber for detecting light from within the wall.

2. The spectroscope of claim **1**, wherein the probe further comprises a jacket enclosing the fiber.

3. The spectroscope of claim **2**, wherein the jacket comprises a coil-wire wound into a coil-wire jacket.

4. The spectroscope of claim **3**, wherein the jacket comprises a coil wire having a variable diameter.

5. The spectroscope of claim **1**, wherein the probe comprises a plurality of optical fibers.

6. The spectroscope of claim **1**, wherein the probe resiliently assumes a preferred shape.

7. The spectroscope of claim **6**, wherein the preferred shape comprises a bow.

8. The spectroscope of claim **6**, wherein the preferred shape comprises an arc.

9. The spectroscope of claim **6**, wherein the preferred shape comprises a portion of a catenary curve.

10. The spectroscope of claim **1**, wherein the atraumatic coupler is disposed at a distal tip of the probe.

11. The spectroscope of claim **10**, wherein the atraumatic coupler comprises a lens attached to the distal tip of the optical fiber.

12. The spectroscope of claim **10**, wherein the atraumatic coupler is integral with the optical fiber.

13. The spectroscope of claim **12**, wherein the atraumatic coupler comprises a distal tip of the optical fiber.

14. The spectroscope of claim **1**, wherein the atraumatic coupler is disposed along a side of the probe.

15. The spectroscope of claim **14**, wherein the atraumatic coupler comprises a window along a side of the probe.

16. The spectroscope of claim **15**, further comprising a diffraction grating in optical communication with the window.

17. The spectroscope of claim **14**, wherein the atraumatic coupler comprises:

a window along a side of the probe, and

a beam re-director providing optical communication between the window and a distal tip of the fiber.

18. The spectroscope of claim **17**, wherein the beam re-director comprises a prism.

19. The spectroscope of claim **14**, wherein the atraumatic optical coupler comprises:

a window along the side of the probe, and

a distal face of the optical fiber, the face being oriented to provide optical communication with the window.

20. The spectroscope of claim **1**, wherein the light source comprises a near infrared light source.

21. The spectroscope of claim **1**, further comprising a processor in data communication with the detector, the processor being configured to identify a vulnerable plaque on the basis of a signal provided by the detector.

22. The spectroscope of claim **1**, further comprising a cannula through which the probe passes.

23. The spectroscope of claim **22**, wherein the probe is integral with the cannula.

24. The spectroscope of claim **22**, wherein the optical fiber is embedded within the cannula.

25. The spectroscope of claim **22**, wherein the cannula comprises walls forming a channel through which the probe passes, the channel being conformal to the cannula.

26. The spectroscope of claim **25**, wherein the cannula has a tapered distal opening such that the channel has an opening facing a longitudinal axis of the cannula.

27. The spectroscope of claim **25**, wherein the cannula has a flared distal opening such that the channel has an opening facing away from a

longitudinal axis of the cannula.

28. The spectroscope of claim **1**, further comprising a hub to which a distal end of the probe is attached.

29. The spectroscope of claim **28**, further comprising a cannula through which the hub and the probe pass.

30. The spectroscope of claim **29**, wherein the probe resiliently assumes a bow shape for contacting the intraluminal wall at a point of inflection thereof.

31. The spectroscope of claim **30**, wherein the coupler is disposed at the point of inflection.

32. The spectroscope of claim **1**, further comprising a spacer attached to the probe for maintaining a preferred relative position of the probe.

33. A spectroscope for detecting vulnerable plaque within a lumen defined by an intraluminal wall, the spectroscope comprising:

a cannula having a longitudinal axis;

a plurality of probes extending through the cannula, each probe having

an optical fiber extending therethrough, and

an atraumatic light-coupler in optical communication with the optical fiber, the coupler being configured to atraumatically contact the intraluminal wall.

34. The spectroscope of claim **33**, further comprising a spacer ring attached to each of the probes for maintaining the positions of the probes relative to each other.

35. The spectroscope of claim 33, further comprising a hub attached to a distal end of each of the probes.

36. The spectroscope of claim 35, wherein the distal end of the probe is attached to the hub at an anchor point that is circumferentially offset from a proximal portion of the probe.

37. The spectroscope of claim 35, further comprising a spacer ring attached to each of the probes for maintaining the positions of the probes relative to each other.

38. The spectroscope of claim 35, wherein each of the probes resiliently assumes a bow shape having a point of inflection between the hub and the cannula.

39. The spectroscope of claim 33, wherein each of the probes resiliently assumes a desired shape.

40. The spectroscope of claim 33, wherein the atraumatic coupler comprises means for providing optical communication between the optical fiber and the intraluminal wall.

41. The spectroscope of claim 33, wherein at least one of the plurality of probes is integral with the cannula.

42. The spectroscope of claim 33, wherein the optical fiber is embedded within the cannula.

43. A method of detecting vulnerable plaque within an intraluminal wall, the method comprising:

placing an atraumatic light coupler in contact with the intraluminal wall;

passing light through the intraluminal wall by way of the atraumatic light coupler;

receiving light from within the intraluminal wall by way of the atraumatic coupler; and

providing the received light to a processor for analysis to identify the presence of a vulnerable plaque.

44. The method of claim **43**, wherein placing an atraumatic light coupler in contact with the intraluminal wall comprises placing a distal end of a probe in contact with the intraluminal wall.

45. The method of claim **43**, wherein placing an atraumatic light coupler in contact with the intraluminal wall comprises placing a side of a probe in contact with the intraluminal wall.

46. A spectroscope for detecting vulnerable plaque within a lumen defined by an intraluminal wall, the spectroscope comprising:

a probe having

an optical fiber extending therethrough, and

means for atraumatically contacting the intraluminal wall, the contacting means including means for providing optical communication with the intraluminal wall;

a light source in optical communication with the fiber for illuminating the wall; and

a detector in optical communication with the fiber for detecting light from within the wall.

47. The spectroscope of claim **46**, wherein the means for atraumatically contacting the intraluminal wall comprises a rounded surface at a distal tip of the probe.

48. The spectroscope of claim **47**, wherein the rounded surface comprises a surface of a lens attached to the fiber.

49. The spectroscope of claim **48**, wherein the means for providing optical communication comprises the lens.

50. The spectroscope of claim **47**, wherein the rounded surface comprises a surface of the fiber.

51. The spectroscope of claim **43**, wherein the means for providing optical communication comprises the fiber.

52. The spectroscope of claim **46**, wherein the means for atraumatically contacting the intraluminal wall comprises a side-window along a side of the probe.

53. The spectroscope of claim **52**, wherein the means for providing optical communication comprises a reflective surface in optical communication with the side-window and with a face of the fiber.

54. The spectroscope of claim **52**, wherein the means for providing optical communication comprises an angled face of the fiber.

55. The spectroscope of claim **52**, wherein the means for providing optical communication comprises a diffraction grating in optical communication with the side-window and with the fiber.